Site effect estimation through site characterization from ambient noise recordings, EUROSEIS-test (Volvi, Greece)

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Site effect assessment is an important step in seismic risk mitigation. There is therefore a drastic need for cost-effective proxies to site effects estimates. In that context, a new promising approach was proposed, using the time-average velocity over the top z meters with z varying form 5, 10, 20 and 30 meters (Vsz) and the fundamental resonance frequency (f_0) as a two-parameters characterization of a site. Then to assess site effect, a Site Amplification Prediction Equation, SAPE, completely defined by these two parameters was build-up based on Japanese data from the KiK-Net network. Thus it remains to be validated using other dataset. For that aim the EUROSEIS-test data is a suitable one.

The EUROSEIS-test is a sedimentary basin in northern-Greece that has been thoroughly investigated through grants from the European Commission, mainly to study site effects. Fourteen accelerometric stations have been installed since 1995, that to date recorded more than 100 events. After a review of the main available information over the EUROSEIS-test, we end up with a poor Vs description for some of the accelerometric stations. Thus eight accelerometric stations were selected for noise array measurements surveys to provide more details information about Vsz and f_0 parameters. The noise array technique has been proposed some decades ago but its development is still in progress, particularly regarding the inversion step. Different approaches (Savvaidis el al. 2009, Renalier et al. 2009) were tested in this study to provide Vsz. These two inversion strategies provide comparable Vsz for z equals to 10, 20 and 30 meters.

With the resulting Vsz and f_0 from noise analysis, a validation-test of the so-called SAPE was realized. The results of such a comparison are encouraging and indicate as well limitations of the SAPE approach. It is a promising tool for engineering and seismic risk management.